AMENDMENT UNDER 37 CFR § 1.116
Appln. No. 09/993,621

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (previously presented): A production method of a dehydration reaction product which comprises a dehydration reaction step of subjecting a reaction solution containing a polymerizable compound to the dehydration reaction,

said dehydration reaction step comprising using a dehydration reaction apparatus,

said dehydration reaction apparatus comprising a reaction vessel, a condenser and a connecting pipe joining said reaction vessel with said condenser and

satisfying the requirement:

$$0.05 < (B^3/A) < 2 \text{ and } 1 < A < 100$$

where A is a capacity (m^3) of said reaction vessel and B is a total length (m) of said connecting pipe on the horizontal basis.

2. (canceled).

3. (original): The production method of a dehydration reaction product according to Claim 1,

wherein said pipe has a gradient (θ).

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4. (original): The production method of a dehydration reaction product according to Claim 1,

wherein said gradient (θ) is 0.3 to 70°.

5. (currently amended): A production method of a dehydration reaction product to be applied to a production of a polymer for cement additives

which comprises a dehydration reaction step of using a vertical multitubular heat exchanger in producing the dehydration reaction product from a reaction solution,

said vertical multitubular heat exchanger exchanging heat between an extratubular fluid and a distillate from said reaction solution and

having a structure comprising a body having an extratubular fluid inlet and an extratubular fluid outlet, covers provided at both upper and lower ends of said body, tubesheets provided in the vicinity of the both upper and lower ends of inside of said body and a plurality of heat exchanger tubes connected between said tubesheets, and

no substantial retention areas for said distillate occurring on a connecting site between said tubesheet and said heat exchanger tube, and

wherein an antigelling agent is caused to act on said distillate when carrying out the dehydration reaction step by exchanging heat between the distillate and the extratubular fluid using said vertical multitubular heat exchanger and said reaction solution contains (meth)acrylic acid and/or a dehydration reaction product derived therefrom.

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6. (currently amended): A production method of a dehydration reaction product to be applied to a production of a polymer for cement additives

which comprises a dehydration reaction step of using a vertical multitubular heat exchanger in producing the dehydration reaction product from a reaction solution,

said vertical multitubular heat exchanger exchanging heat between an extratubular fluid and a distillate from said reaction solution and

having a structure comprising a body having an extratubular fluid inlet and an extratubular fluid outlet, covers provided at both upper and lower ends of said body, tubesheets provided in the vicinity of the both upper and lower ends of inside of said body and a plurality of heat exchanger tubes connected between said tubesheets, and

no substantial protrusions of said heat exchanger tubes occurring on the surface, with which said distillate comes into contact, of at least a tubesheet provided in the vicinity of the upper end out of said tubesheets, and

wherein an antigelling agent is caused to act on said distillate when carrying out the dehydration reaction step by exchanging heat between the distillate and the extratubular fluid using said vertical multitubular heat exchanger and said reaction solution contains (meth)acrylic acid and/or a dehydration reaction product derived therefrom.

7. (canceled).

8. (canceled).

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6. (currently amended): A production method of a dehydration reaction product to be applied to a production of a polymer for cement additives

which comprises a dehydration reaction step of using a vertical multitubular heat exchanger in producing the dehydration reaction product from a reaction solution,

said vertical multitubular heat exchanger exchanging heat between an extratubular fluid and a distillate from said reaction solution and

having a structure comprising a body having an extratubular fluid inlet and an extratubular fluid outlet, covers provided at both upper and lower ends of said body, tubesheets provided in the vicinity of the both upper and lower ends of inside of said body and a plurality of heat exchanger tubes connected between said tubesheets, and

no substantial protrusions of said heat exchanger tubes occurring on the surface, with which said distillate comes into contact, of at least a tubesheet provided in the vicinity of the upper end out of said tubesheets, and

wherein an antigelling agent is caused to act on said distillate when carrying out the dehydration reaction step by exchanging heat between the distillate and the extratubular fluid using said vertical multitubular heat exchanger and said reaction solution contains (meth)acrylic acid and/or a dehydration reaction product derived therefrom.

7. (canceled).

8. (canceled).

9. (original): The production method of a dehydration reaction product according to Claim 1, 5 or 6,

wherein said dehydration reaction step comprises a step of subjecting a reaction solution containing an alcohol and (meth)acrylic acid to esterification reaction to form an ester and/or a step of subjecting a reaction solution containing an amine and (meth)acrylic acid to amidation reaction to form an amide.

10. (currently amended): A production method of a dehydration reaction product

which comprises a dehydration reaction step of subjecting an alcohol and/or an amine with (meth)acrylic acid to esterification and/or amidation in the presence of a dehydrating solvent,

said dehydration reaction step comprising using a reaction vessel and a water separator,

said water separator being provided with a feeding pipe connected with said reaction vessel, and

having a gaseous phase section and a liquid phase section there within, and

said feeding pipe having openings in the gaseous phase section and in the liquid phase section, and

wherein said alcohol is represented by the following general formula (1):

$$R^1O(R^2O)_nH \quad (1)$$

in the formula, R^1 represents a hydrocarbon group containing 1 to 30 carbon atoms, R^2O are the same or different and each represents an oxyalkylene group containing 2 to 18 carbon atoms, and n represents an average number of moles added of the oxyalkylene group represented by R^2O and is a number of 0 to 300.

11. (original): The production method of a dehydration reaction product according to Claim 10,

wherein the opening of said feeding pipe in the gaseous phase section comprises one or a plurality of holes made on the side face of said feeding pipe.

12. (original): The production method of a dehydration reaction product according to Claim 10,

wherein said water separator is provided with a baffle plate and the opening of said feeding pipe in the gaseous phase section is in the direction opposite to said baffle plate.

13. (currently amended): A production method of a dehydration reaction product which comprises a dehydration reaction step of subjecting an alcohol and/or an amine with (meth)acrylic acid to esterification and/or amidation in the presence of a dehydrating solvent,

said dehydration reaction step comprising using a reaction vessel and a water separator, and

said water separator being provided with a feeding pipe connected with said reaction vessel, having a gaseous phase section and a liquid phase section therewithin,

having smaller diameter in a lower portion thereof than a diameter in an upper portion, and

being so controlled that an interface between the dehydrating solvent and byproduct water is maintained in a lower portion thereof, and

wherein said alcohol is represented by the following general formula (1):

$$R^1O(R^2O)_nH \quad (1)$$

in the formula, R^1 represents a hydrocarbon group containing 1 to 30 carbon atoms, R^2O are the same or different and each represents an oxyalkylene group containing 2 to 18 carbon atoms, and n represents an average number of moles added of the oxyalkylene group represented by R^2O and is a number of 0 to 300.

14. (currently amended): A production method of a dehydration reaction product

which comprises a dehydration reaction step of subjecting an alcohol and/or an amine with (meth)acrylic acid to esterification and/or amidation in the presence of a dehydrating solvent,

said dehydration reaction step comprising using a reaction vessel and a water separator,

said water separator being provided with a feeding pipe connected with said reaction vessel,

having a gaseous phase section and a liquid phase section therewithin and

being provided with a detection device ~~of~~ at an interface between the dehydrating solvent and byproduct water and/or a gas/liquid interface, and

an antigelling agent being caused to act on inside of said detection device, and

wherein said alcohol is represented by the following general formula (1):

$$R^1O(R^2O)_nH \quad (1)$$

in the formula, R^1 represents a hydrocarbon group containing 1 to 30 carbon atoms, R^2O are the same or different and each represents an oxyalkylene group containing 2 to 18 carbon atoms, and n represents an average number of moles added of the oxyalkylene group represented by R^2O and is a number of 0 to 300.

15. (canceled).

16. (original): The production method of a dehydration reaction product according to Claim 1, 5, 6, 10, 13 or 14,

wherein said dehydration reaction product is used as a starting material for a production of a polymer for cement additives.

17. (canceled).

18. (previously presented): : The production method of a dehydration reaction product according to

Claim 1,

wherein said gradient (Θ) is 0.5 to 45°.

19. (new): The production method of a dehydration reaction product according to Claim 1,

wherein said A satisfies the requirement:

$1 < A < 50$.